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93

THE ABO SYSTEM AMONG THE MACASSAI FROM PORTUGUESE TIMOR

by

MARIA EMÍLIA DE CASTRO E ALMEIDA (*)

INTRODUCTION.

The Macassai form an ethnolinguistical group in Timor and live in the Luro region (Lautém department). They are neighbours to the Fata-luku (1) with whom they mingle quite frequently, thereby the reason for the serological study (ABO system) of the Macassai and also the confrontation of the obtained results with those relative to the Fata-luku (2).

As is known, the determination of the ABO system, currently used in modern Anthropology, is very important, in so far as it can be helpful in explaining the origin and relationship between different peoples, in fact a thrilling challenge to Man.

Two samples of the Macassai and two samples of the Fata-luku were obtained in 1953-1954 in Timor by the Anthropological Mission for Timor of the «Junta de Investigações do Ultramar», and include 547 (298 ♂ and 249 ♀) and 440 (340 ♂ and 100 ♀) individuals, respectively.

After a previous statistical study of the two Macassai series, it was found useful to repeat the sampling of the population because: 1) the series ♂ had only a probability from 2% to 5% to follow Bernstein's genetic hypothesis; 2) from the statistical results it was shown that the series ♂ and ♀ were not representative samples of the same population.

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(1) They call themselves Fata-luku but they are known as Dágadà by their neighbours. For further explanations refer to «*Contribuição para o estudo da olaria entre os Fata-luku de Timor Português*».

(2) See «*Contribution à l'étude serologique des Dágadà (Timor Portugais) — système ABO*».

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By the reasons pointed out in 1957, new samples of blood were drawn from 200 individuals (100 belonging to sex ♂ and the remaining 100 to sex ♀).

The blood was drawn according to the Beth-Vicent's technique, having been tested on cards specially prepared for the purpose with appropriate liquid serums; later, after a few minutes of blood-serum mixture, the blood groups of the examined individuals were determined on being read the cards.

I — MACASSAI INITIAL SERIES. PERCENTAGES. BERNSTEIN'S GENETIC HYPOTHESIS.

Let us now consider the statistical study of the different Macassai series.

For the first Macassai series ♂ (we'll call it V♂), the following frequencies and percentages of blood groups A, B, AB and O were obtained:

TABLE I (V♂)

Blood groups	*Obtained frequencies*	*Percentages*
A	73	24.50
B	90	30.20
AB	9	3.00
O	126	42.30
Total	298	100.00

whereas in the corresponding series ♀ (V♀) the blood groups A, B, AB and O attained the following frequencies and percentages:

TABLE II (V♀)

Blood groups	*Obtained frequencies*	*Percentages*
A	42	16.90
B	60	24.10
AB	8	3.20
O	139	55.80
Total	249	100.00

The serological frequencies and percentages of the 1957 male series (N♂) were as follows:

TABLE III (N♂)

Blood groups	*Obtained frequencies*	*Percentages*
A	19	19.00
B	34	34.00
AB	2	2.00
O	45	45.00
Total	100	100.00

Table IV shows the values relative to the female (N♀) frequencies and respective percentages:

TABLE IV (N♀)

Blood groups	*Obtained frequencies*	*Percentages*
A	30	30.00
B	30	30.00
AB	4	4.00
O	36	36.00
Total	100	100.00

In all these Tables group O is prevailing. Group B follows generally with a more important value than A (with the exception of N♀ seriation). AB shows the lowest percentage values.

*

The following parameters were obtained for each series of the Macassai, from the values experimentally found for A, B, AB and O.

TABLE V (V♂)

A = 73 B = 90 AB = 9 0 = 126 N = 298

Parameters	*Provisional values*	*Corrections*	*Corrected values*
p	.14863	+.00136	.14999
q	.18282	+.00167	.18449
r	.65025	+.01518	.66543
Total	.98170		.99991

The following values were obtained for the series V♀, from A, B, AB and O:

TABLE VI (V♀)

A = 42 B = 60 AB = 8 O = 139 N = 249

Parameters	*Provisional values*	*Corrections*	*Corrected values*
p	.10602	—.00003	.10599
q	.14741	—.00004	.14737
r	.74714	—.00051	.74663
Total	.00057		.99999

As for series N♂, the calculated values were as follows:

TABLE VII (N♂)

A = 19 B = 34 AB = 2 O = 45 N = 100

Parameters	*Provisional values*	*Corrections*	*Corrected values*
p	.11118	+.00100	.11218
q	.20000	+.00180	.20180
r	.67082	+.01512	.68594
Total	.98200		.99992

and the figures obtained for series N♀ were those shown in Table VIII.

TABLE VIII (N♀)

A = 30 B = 30 AB = 4 0 = 36 N = 100

Parameters	*Provisional values*	*Corrections*	*Corrected values*
p	.18760	+.00233	.18993
q	.18760	+.00233	.18993
r	.60000	+.01999	.61999
Total	.97520		.99985

The criterion of significance of the mean error has been used to test the assurance of the different parameters in each sample with the hypothesis $p + q + r = 1$, and the following figures resulted in consequence:

For the series V♂: $D = +.01830$ and $m = .00837$ $\therefore \frac{D}{m} = 2.18683$, which comes to a probability from 5% to 2%.

As for the series V♀ the following values were obtained: $D = -.00057$ and $m = .00632$ $\therefore \frac{D}{m} = .09019$, which, on the basis of suitable tables, comes to a probability $100\% > P > 90\%$.

For the series N♂: $D = +.01800$ and $m = .01265$, being $\frac{D}{m} = 1.42292$, which gives a probability $20\% > P > 10\%$ upon calculation with appropriate probability tables.

In what concerns series N♀, the following values were obtained: $D = +.02480$ and $m = .01643$ $\therefore \frac{D}{m} = 1.50943$, which gives a probability $20\% > p > 10\%$ through the tables.

Thus we see that the four Macassai series confirm the hypothesis $p + q + r = 1$, though the seriation V♂ is rather near the 1% limit (ranging between 5% and 2%).

II — STEVENS' CIRCLES (MACASSAI).

From the above conclusions it would have been interesting to confirm whether the Macassai series could or could not be considered, statistically, as samples of one same population. As in the previously mentioned work

dealing with Dágadà, two techniques were used in order to verify the fact: a more rapid one — the visual method (the Stevens' circles technique) — and the statistically exact one (the Stevens' test of the significance of the differences between two groups of data).

In what concerns the first technique, the series represented by appropriate circles are shown in Table IX.

Through the analysis of the Stevens' circles graph it can be seen that the series V♀ and N♀ are not samples of one same population, there being doubts about series V♂ and V♀.

III — STEVENS' TEST OF THE SIGNIFICANCE OF THE DIFFERENCES (MACASSAI).

The most difficult technique — less suggestive to the eye, but more exact — is the Stevens' test of the significance of the differences between two groups of data, which leads to the same conclusions as the Stevens' circles technique.

In Tables X, XI, XII, XIII, XIV, XV different data are set up, which also allow us to reach the former results. They are, namely, the number of observations (N), the probabilities of appearing genes concerning A (p) and B (q) and the ponderate means of the parameters p and q of different series.

After each Table, χ^2 values are given so as to verify the possibility of the samples entered in the tables not being from one same population.

TABLE IX

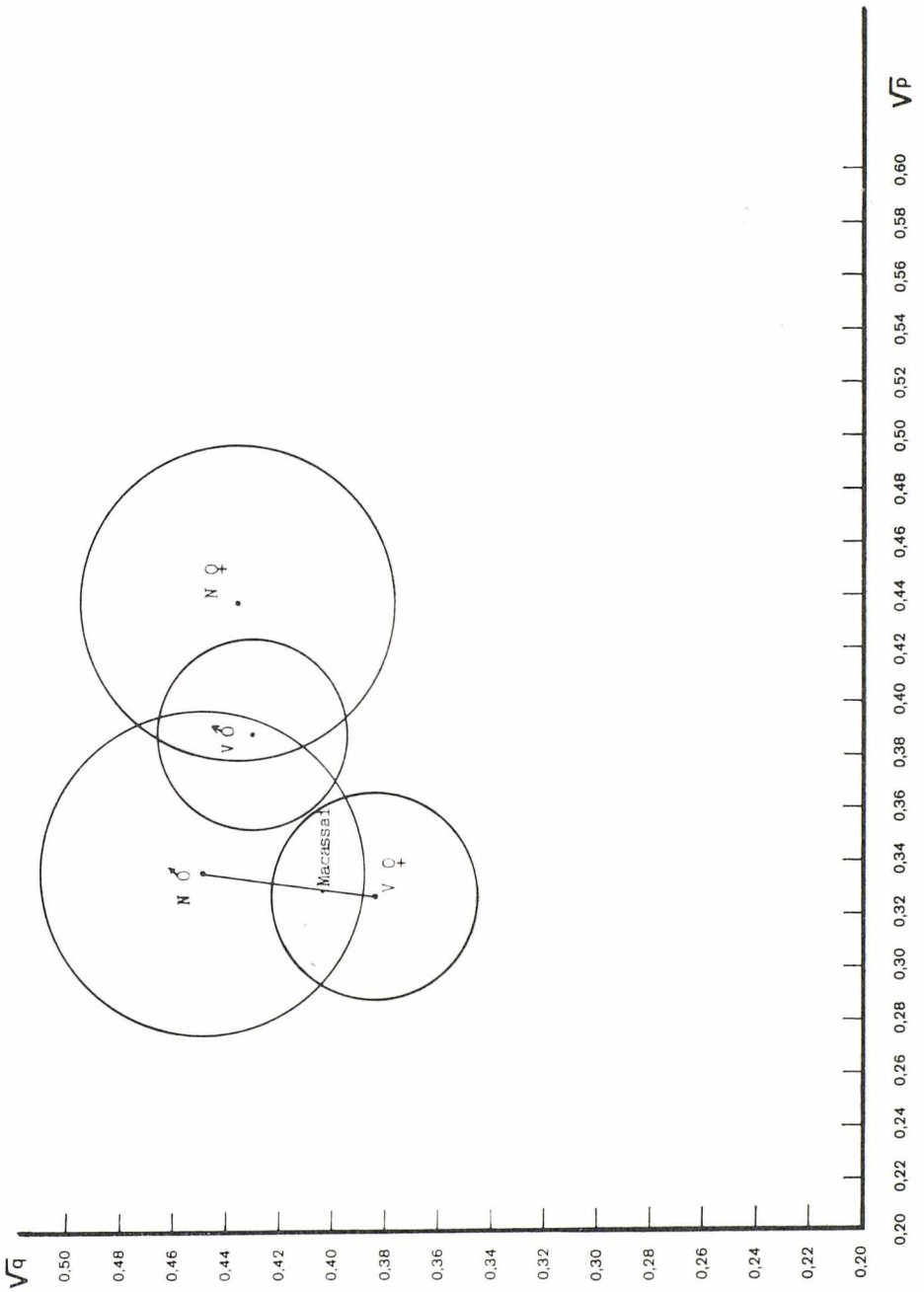

√q
0,50
0,48
0,46
0,44
0,42
0,40
0,38
0,36
0,34
0,32
0,30
0,28
0,26
0,24
0,22
0,20
N ♂
N ♀
V ♂
V ♀
Macassai
0,20 0,22 0,24 0,26 0,28 0,30 0,32 0,34 0,36 0,38 0,40 0,42 0,44 0,46 0,48 0,50 0,52 0,54 0,56 0,58 0,60
√p

TABLE X

	N	p	q	1/N	Np	Nq
V♂	298	.14999	.18449	.00336	44.69702	54.97802
V♀	249	.10599	.14737	.00402	26.39151	36.69513
	547			.00738	71.08853	91.67315
Differences	Sp = .04400; Sq = + .03712					
Means	p = .12996; q = .16759					

It was found a probability range from 1% to 2% for the respective χ^2 (with two degrees of freedom), on the basis of the Stevens' formula.

TABLE XI

	N	p	q	1/N	Np	Nq
V♂	298	.14999	.18449	.00336	44.69702	54.97802
N♂	100	.11218	.20180	.01000	11.21800	20.18000
Total	398			.01336	55.91502	75.15802
Differences	Sp = +.03781; Sq = +.01731					
Means	p = .14049; q = .18884					

In Table XI there are identical data as in Table X, but referring to the two seriations V♂ and N♂.

It was found a χ^2 (two degrees of freedom) equal to 1.72455 which led to a probability from 30% to 50%.

TABLE XII

	N	p	q	1/N	Np	Nq
V♂	298	.14999	.18449	.00336	44.69702	54.97802
N♀	100	.18993	.18993	.01000	18.99300	18.99300
Total	398			.01336	63.69002	73.97102
Differences	Sp = − .03994; Sq= − .00544					
Means	p = .16003; q = .18586					

Let us now compare two series, male and female (V♂ and N♀), but of different periods — Table XII.

The χ^2 (two degrees of freedom) is 1.80090 which corresponds to $30\% < P < 50\%$.

TABLE XIII

	N	p	q	1/N	Np	Nq
V♀	249	.10599	.14737	.00402	26.39151	36.69513
N♂	100	.11218	.20180	.01000	11.21800	20.18000
Total	349			.01402	37.60951	56.87513
Differences	Sp = − .00619; Sq = − .05443					
Means	p = .10776; q = .16297					

From the combination of series V♀ with N♂ the results obtained are shown in the Table XIII.

A value of 3.03994 is now calculated for the χ^2 (two degrees of freedom) which corresponds to the probability from 30% to 20%, according to the respective tables.

TABLE XIV

	N	p	q	1/N	Np	Nq
V♀	249	.10599	.14737	.00402	26.39151	36.69513
N♀	100	.18993	.18993	.01000	18.99300	18.99300
Total	349			.01402	45.38451	55.68813
Differences	Sp = − .08394; Sq = − .4256					
Means	p = .13004; q = .15956					

On considering the seriations V♀ and N♀ we draw the Table XIV.

The obtained χ^2 was 11.49643, which is equivalent to $.1\% < P < 1\%$ for 2 d. f.

TABLE XV

	N	p	q	1/N	Np	Nq
N♂	100	.11218	.20180	.01000	11.21800	20.18000
N♀	100	.18993	.18993	.01000	18.99300	18.99300
Total	200			.02000	30.21100	39.17300
Differences	Sp = − .07775; Sq = + .01187					
Means	p = .15106; q = .19587					

The last possible combination refers to the series N♂ and N♀ and presents the figures in Table XV.

The χ^2 (with two degrees of freedom) obtained according to the Stevens' method attains 4.79450 in our case, that is, a probability ranging from 5% to 10%.

*

Thus the significance test confirmed the informations produced by the Stevens' circles test.

In order to avoid duplications of the studied individuals it was found useful to put together, whenever statistically possible, only series of males with series of females. It is not possible to join V♂ with N♀, once they are not samples of the same population, in what concernes the studied characteristic, as was shown before, but 1) V♂ can be united with N♀, 2) N♂ with V♀ and 3) N♂ with N♀.

IV — MACASSAI COMBINED SERIES. PERCENTAGES. BERNSTEIN'S GENETIC HYPOTHESIS.

The values of the respective frequencies and percentages of the combined series V♂-N♀ are shown in Table XVI.

TABLE XVI

Blood groups	*Frequencies*	*Percentages*
A	103	25.90
B	120	30.10
AB	13	3.30
O	162	40.70
Total	398	100.00

When the frequencies data are properly dealt with, we obtain the following values:

TABLE XVII

Parameters	*Provisional values*	*Correction*	*Corrected values*
p	.15825	—	—
q	.18401	—	—
r	.63800	—	—
Total	.98026	—	—

On applying the mean error criterion to the values of Table XVII, it is verified that the series does not agree with the hypothesis $p + q + r = 1$.

The obtained values were $D = +.01974$; $m = .00707$ and $\frac{D}{m} = 2.79208$, which means that the series is not significant within a range of probability from .1% to 1%.

*

The values of the frequencies and percentages of the combined series N♂-V♀ are given in Table XVIII:

TABLE XVIII

Blood groups	*Frequencies*	*Percentages*
A	61	17.50
B	94	26.90
AB	10	2.90
O	184	52.70
Total	349	100.00

Table XIX presents provisional and corrected data of the population parameters, obtained from the frequencies of the new seriation.

TABLE XIX

Parameters	*Provisional values*	*Corrections*	*Corrected values*
p	.10750	+.00023	.10773
q	.16215	+.00035	.16250
r	.72610	+.00370	.72980
Total	.99575		1.00003

On using the mean error criterion once again, one sees that the combined seriation agrees with the proposed hypothesis, the obtained figures being the following ones: $D = + .00425$; $m = .00548$ and $\frac{D}{m} = .77555$, that is, employing in the tables a significance probability for the series between 40% and 50%.

*

From the combined series N♂-N♀ the following values for the frequencies and percentages derive:

TABLE XX

Blood groups	*Frequencies*	*Percentages*
A	49	24.50
B	64	32.00
AB	6	3.00
O	81	40.50
Total	200	100.00

Table XXI carries the provisional and corrected data of the population parameters, calculated, as always, from the frequencies.

TABLE XXI

Parameters	*Provisional values*	*Corrections*	*Corrected values*
p	.14853	+.00158	.15011
q	.19377	+.00206	.19583
r	.63640	+.01754	.65394
Total	.97870		.99988

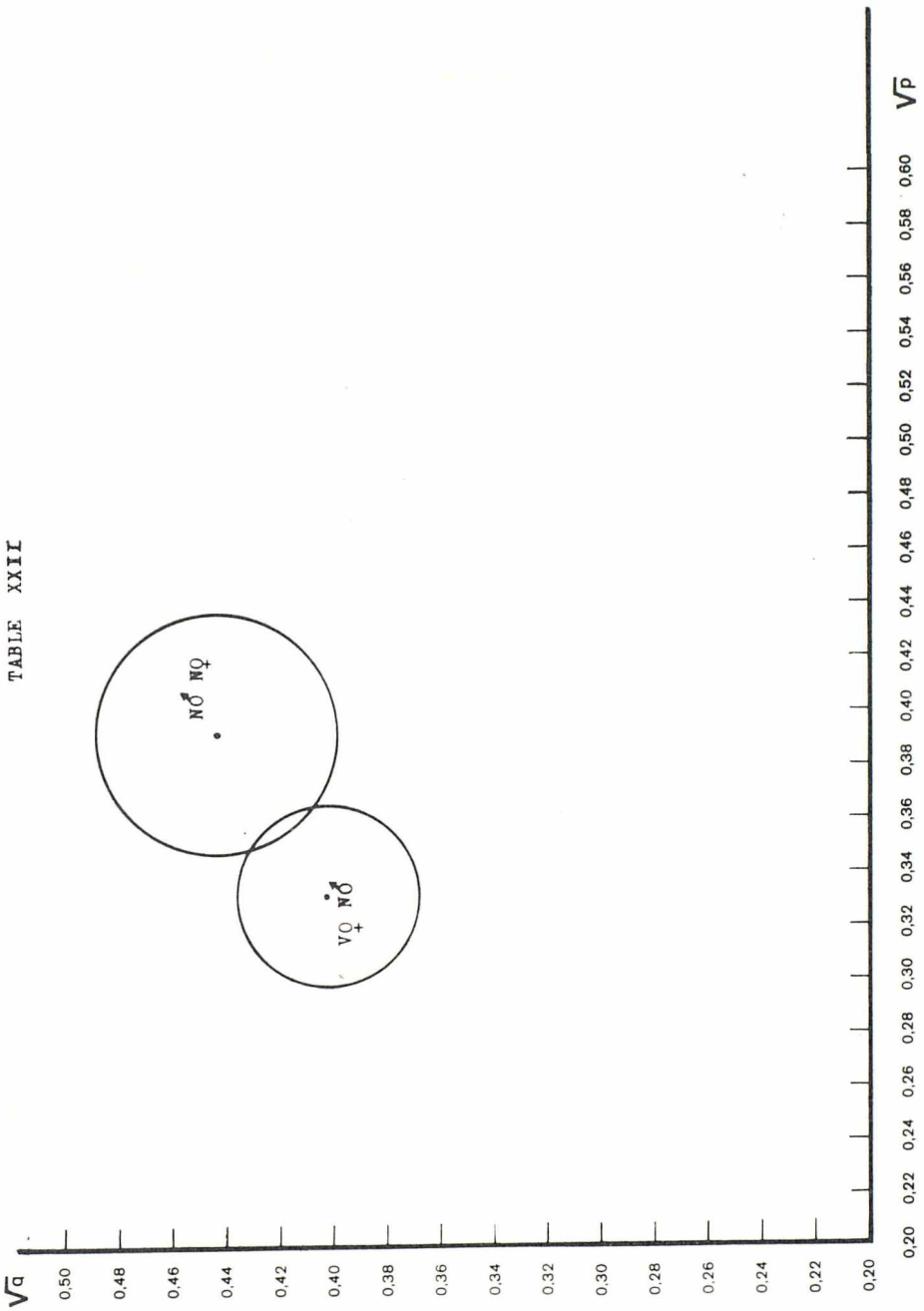
The figures obtained through the mean error criterion confirm that the series agrees with the hypothesis between 2% and 5% limits, with D = .02130; m = .01000 and $\frac{D}{m} = 2.13000$.

V — SELECTED SERIES. PARTIAL χ^2 INFLUENCE.

On account of the above results, series V♂-N♀ had to be excluded, once it does not follow Bernstein's genetic hypothesis, whereas series N♂-N♀ is near the 1% significance limit; as it is less numerous, seriation N♂-V♀ had to be chosen as the representative series for this ethnolinguistical group (Stevens' circles in Table XXII confirm the choice).

The χ^2 for the obtained seriation was calculated in order to appreciate the influence of partial χ^2s upon their total value.

TABLE XXII


√q
0,50
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0,20
0,20 0,22 0,24 0,26 0,28 0,30 0,32 0,34 0,36 0,38 0,40 0,42 0,44 0,46 0,48 0,50 0,52 0,54 0,56 0,58 0,60
√p
NO NQ
VQ NO

TABLE XXIII

Blood groups	*Observed frequencies*	*Theoretical frequencies*	χ^2
A	61	58.92811	.07285
B	94	91.99335	.04377
AB	10	12.21928	.40307
O	184	185.88021	.01902
Total	349	349.02095	.53871

The probability (with two degrees of freedom) calculated from the obtained χ^2 leads to a probability from 30% to 50%, which confirms also the mean error test. As for the partial χ^2s it is true that the χ^2 referrent to AB contributes to the total value most.

VI — COMPARISON OF SELECTED MACASSAI SERIES WITH DÁGADÀ SERIATION.

It was further compared the seroanthropological image obtained for the Fata-luku of Portuguese Timor (already found to be statistically representative) (1) with that chosen for the Macassai, in order to verify whether both seriations constitute or not samples of one same population. The two already mentioned criteria, the graph test and the «test of the significance of the differences between two groups of data» were used so as to find out the solution to the problem.

From the first one (Table XXIV), it comes out that the two ethnolinguistical groups are samples of one same population.

Let us see what happens when the «test of the significance of the differences between two groups of data» is used. In Table XXV the number of obtained observations, the probabilities of appearing genes referrent to A and B (namely p and q) and the weighed means of these parameters are arranged in good order.

(1) See «*Contribution à l'étude sérologique des Dágadà (Timor Portugais) — système ABO*».

TABLE XXIV

M - Macassai

D - Dágadá

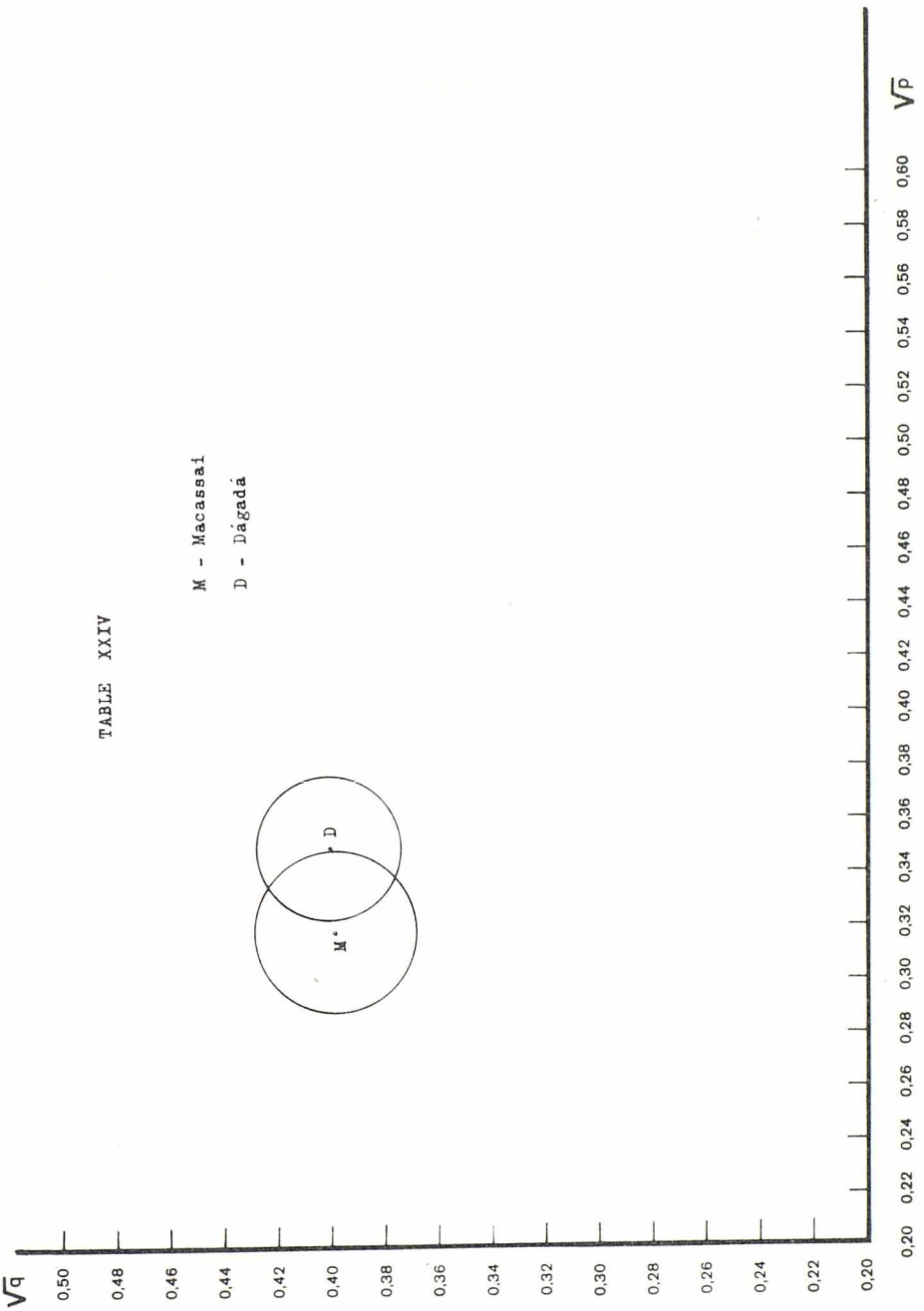

TABLE XXV

Seriations	N	p	q	1/N	Np	Nq
Fata-luku	440	.13093	.16417	.00227	57.60920	72.23480
Macassai	349	.10773	.16250	.00287	37.59777	56.71250
Total	789			.00514	95.20697	128.94730
Differences	Sp = + .02320; Sq = + .00167					
Means	p = .12067; q = .16343					

The χ^2 (with two degrees of freedom) comes to attain a value of 1.92996, which gives a probability from 30% to 50%.

The two studied groups may thus be considered as samples of one same population in what concerns the referred characteristic, the respective weighed values of p, q and r being the following ones:

$$p = .12067;\ q = .06343;\ r = .71590$$

This means that there is no biochemical difference (ABO) from one to the other of the two ethnolinguistical groups which live in the neighbouring regions and between which there might perhaps have been an interchange of genes due to probable intermingling — what else has been confirmed by the Fata-luku themselves.

RESUMO

Este artigo estuda serològicamente (sistema ABO) o grupo etnolinguístico Macassai de Timor, ocupando-se seguidamente do confronto deste com o Fata-luku (um grupo vizinho), no que respeita a esta característica.

Assim, o A. começa o trabalho investigando através de critérios estatísticos adequados, se as quatro amostras colhidas de Macassai, em 1953-54 e 1957, obedecem ou não à hipótese génica de Bernstein. Verificada tal concordância, procurou determinar gràficamente pelos círculos de Stevens,

e numèricamente pelo teste de significância das diferenças entre dois grupos de dados, se as citadas amostras pertenciam ou não à mesma população. Para evitar uma possível duplicação de indivíduos analisados achou-se conveniente unir apenas (e se tal fosse estatìsticamente possível) séries de machos com séries de fêmeas. Porque não se pode juntar V♂ com V♀, visto que quanto a este carácter, as duas séries referidas não são amostras de uma mesma população, apenas restam para formar seriações combinadas: 1) V♂ com N♀; 2) N♂ com V♀ e 3) N♂ com N♀ (V e N representam simbòlicamente as amostras colhidas em 1953-54 e 1957). Posteriormente investigou-se se as três séries referidas atrás, obtidas a partir das amostras iniciais, obedeciam ou não à hipótese de $p + q + r = 1$. Aconteceu que uma delas não obedecia, pelo que teve de excluir-se, restando apenas as duas seriações: N♂-V♀ e N♂-N♀, de que se escolheu a maior para representar os Macassai.

Em seguida o A. confrontou a série Macassai escolhida N♂-V♀, constando de 349 indivíduos, com a série Fata-luku (Dágadà) de 440 indivíduos, cujo estudo havia feito em trabalho anterior (1968). Tanto os círculos de Stevens como o teste da significância da diferença entre dois grupos de dados indicam que as duas séries podem pertencer à mesma população, no que respeita ao sistema ABO. Significa este facto a existência entre os dois povos considerados, que são vizinhos, de cruzamentos e de consequente troca de genes? É possível que sim, tanto mais que os próprios Fata-luku confirmam a existência de casamentos com os vizinhos Macassai.

RÉSUMÉ

L'auteur fait l'étude sérologique (système ABO) du groupe ethnolinguistique Macassai du Timor Portugais et sa comparaison, selon le même aspect, avec un groupe voisin — les Fata-luku.

On commence pour vérifier si les quatre échantillons de Macassai (recueillis en 1953-54 et 1957) obéissent ou non à l'hypothèse génique de Bernstein, en utilisant des critères statistiques. Après avoir vérifié cette concordance on a cherché à déterminer graphiquement, au moyen des cercles de Stevens, et numériquement par le test de signification des différences entre deux groupes de données, si les échantillons en question appartenaient ou non à la même population. Pour empêcher une possible duplication des individus étudiés, on a trouvé plus convenable de réunir seulement (et si les techniques statistiques le permettaient) les sériations d'hommes avec celles des femmes. En

effet on n'a pu réunir V♂ avec V♀, car en ce qui concerne ce caractère ces deux séries ne sont pas des échantillons d'une même population. On peut seulement combiner les séries: 1) V♂ avec N♀; 2) N♂ avec V♀ et 3) N♂ avec N♀ (V et N sont les symboles des échantillons recueillis respectivement en 1953-54 et 1957). On a après vérifié si ces trois séries, obtenues d'après les échantillons initiels, obéissent ou non à l'hypothèse génique de $p + q + r = 1$. Une des sériations n'obéit pas à cette hypothèse. Des deux autres: N♂-V♀ et N♂-N♀, on a choisi la plus grande pour représenter les Macassai.

On a donc comparé la sériation choisie des Macassai N♂-V♀ (349 individus) avec la série Dágadà (440 individus), dont l'étude avait déjà été faite par l'auteur (1968). Les cercles de Stevens ainsi que le test de signification des différences entre deux groupes de données ont montré que les deux séries pourraient appartenir à une même population, en ce qui concerne le système ABO. Est-il légitime de supposer qu'il existe entre les deux peuplades voisines des métissages et donc des échanges de gènes? C'est possible, car les Fata-luku parlent de mariages entre eux et les Macassai.

SUMMARY

This study deals first with the ethnolinguistical group Macassai of Timor from the serological point of view (ABO system), later confronting it with the Fata-luku (a neighbouring group), in what concerns this characteristic.

Thus the A. begins the study by trying to verify, through proper statistical criteria, whether the four samples of the Macassai, collected in 1953-54 and 1957, confirm the Bernstein's genetic hypothesis. After having established this fact, the A. tried to determine, graphically, through the Stevens' circles test and, numerically, through the test of the significance of the differences between two groups of data, whether the mentioned samples belong or not to the one same population. In order to avoid a possible duplication of the studied individuals it was found suitable to join only (and if statistically relevant) series of males together with series of females. As it is not possible to unite V♂ with V♀ — since, in what concerns the mentioned characteristic, the two seriations are not samples of one same population —, there remain only the following ones to form combined seriations: 1) V♂ with N♀; 2) N♂ with V♀ and 3) N♂ with N♀ (V and N represent symbolically the samples collected in 1953-54 and 1957). Later the A. tried to find out whether the two mentioned seriations, obtained from the initial samples, confirm the hypothesis $p + q + r = 1$. It was discovered that one of them did not

agree, being excluded accordingly, remaining thus the two seriations N♂-V♀ and N♂-N♀ only, the biggest one of them having been selected to represent the Macassai.

Afterwards the A. compared the chosen Macassai seriation N♂-V♀, composed of 349 individuals with the Fata-luku (Dágadà) seriation of 440 individuals, whose study had already been done in a previous work (1968). Both the Stevens' circles test and the test of the significance of the differences between two groups of data show that the two seriations may belong to the one same population, as for the ABO system. Is this fact alone enough to establish the intermingling between the two neighbouring peoples and the consequent interchange of genes? It might be so, especially because the Fata-luku themselves have confirmed the existence of marriages with the neighbouring Macassai (1).

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(1) We are indebt to Dr. Osório Viegas by his careful and expert English version of this paper.

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